ENTOMOLOGICAL NEWS

JULY, 1930

ENTOMOLOGICAL NEWS

Vol. XLI No. 7

FERDINAND HEINRICH HERMAN STRECKER
1836-1901

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PHILADELPHIA, PA.
THE ACADEMY OF NATURAL SCIENCES,
Logan Square

Entered at the Philadelphia, Pa., Post Office as Second Class Matter.
Acceptance for mailing at the special rate of postage prescribed for in Section 1
Act of October 3, 1917, authorized January 15, 1921.

ENTOMOLOGICAL NEWS

published monthly, excepting August and September, by The American Entomological Society.

Philip P. Calvert, Ph.D., Editor; E. T. Cresson, Jr., R. G. Schmieder, Ph.D., Ernest Baylis, Associate Editors; John C. Lutz, Business Manager.

Advisory Committee: Philip Laurent, J. A. G Rehn, Chas. Liebeck, J. Chester Bradley, Ph.D., Frank Morton Jones, John C. Lutz, Max Kisliuk, Jr., Wm. W. Chapman.

The subscription price per year of ten (10) numbers is as follows:

United States and possessions . . .	**$3.00**
Canada, Central and South America . .	**3.15**
Foreign	**3.25**

Single copies 35 cents.

ADVERTISING RATES: Full width of page. Payments in advance.
One issue, 1 in., $ 1.20, 2 in., $ 2.40, half page, $ 4.00, full page, $ 8.00
Ten issues " 11.00, " 20.00, " 35.00, " 70.00

SUBSCRIPTIONS. All remittances and communications regarding subscriptions, non-receipt of the NEWS or of reprints, and requests for sample copies, should be addressed to

ENTOMOLOGICAL NEWS, 1900 Race Street, PHILADELPHIA, PA.

All complaints regarding non-receipt of issues of the NEWS should be presented within three months from date of mailing of the issue. After that time the numbers will be furnished only at the regular rate for single copies. Not more than two issues will be replaced gratis, through loss in transit or in change of address, unless such have been registered, at the subscriber's expense. No subscriptions accepted which involve giving a receipt acknowledged before a notary, except at the subscriber's expense.

MANUSCRIPTS AND ADVERTISEMENTS. Address all other communications to the editor, Dr. P. P. Calvert, Zoological Laboratory, University of Pennsylvania, Philadelphia, Pa.

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Stated Meetings of The American Entomological Society will be held at 7.30 o'clock P. M., on the fourth Thursday of each month, excepting June, July, August, November and December, and on the third Thursday of November and December.

Communications on observations made in the course of your studies are solicited; also exhibits of any specimens you consider of interest.

The printer of the "News" will furnish reprints of articles over and above the twenty-five given free at the following rates: One or two pages, twenty-five copies, 35 cents; three or four pages, twenty-five copies, 70 cents; five to eight pages, twenty-five copies, $1.40; nine to twelve pages, twenty-five copies, $2.00; each half-tone plate, twenty-five copies, 30 cents; each plate of line cuts, twenty-five copies, 25 cents; greater numbers of copies will be at the corresponding multiples of these rates.

ALBERT F. WINN

ENTOMOLOGICAL NEWS

VOL. XLI. JULY, 1930 No. 7

North American Institutions Featuring Lepidoptera.

XVI. Peter Redpath Museum, Montreal, Canada.

By J. D. GUNDER, Pasadena, California.

(Plate XX.)

Peter Redpath is remembered because of his munificent donations to the McGill University and probably the most noteworthy is the Museum which bears his name. It was opened in 1882 primarily as a research depository for study collections in connection with the school and occupies a conspicuous site on a terrace overlooking the campus amid rows of stately elm and maple trees. The structure which is shown on Plate XX is of grey limestone of Greek design and like other buildings on the campus and in Montreal, has that solid, lasting appearance so characteristic of the metropolis. Though not a large museum and comparatively unknown, it is of special interest to the entomological world because of its being the depository of important collections of Canadian insects. Montreal has long been a center of entomological activity.

In the September, 1901, ENTOMOLOGICAL NEWS, there appears an article by Mr. Hal Newcomb, entitled "A Trip to Montreal," giving an account of the Lepidoptera collections which he found in the city. At that time there were a number of private collections, more or less extensive, well cared for and accurately labeled, but those in museums were negligible, for as yet the Redpath Museum had not developed its entomological department and the Lyman Entomological Room was non-existent.

Readers of the NEWS may recall the tragic death of Mr. H. H. Lyman and his wife in the disaster of the S. S. Empress of Ireland, which was sunk by collision in the Gulf of St. Lawrence, outward bound, on the 29th of May, 1914. Our pages contain an obituary note in Vol. XXV, pp. 335-6, and a more extended account of his life, with portrait and partial list

of writings on Lepidoptera, is given in the *Canadian Entomologist,* Vol. XLVI, p. 221. Mr. Lyman was an industrious collector and built up not only a splendid cabinet of Lepidoptera and their types, but a good library at the same time. In his will he expressed the wish that the McGill University, in accepting his collections, would provide a suitable place in the Museum to house the cabinets, etc., and that the room be known as "The Lyman Entomological Room." He provided as well, a sum of money for the care, maintenance and augmentation of the collection. There was also a proviso that the library be kept in close proximity, a provision which is thoroughly appreciated by anyone doing taxonomic work.

When the material was delivered to the Museum it consisted of 4 cabinets of 30 drawers, each containing about 12,000 specimens, and innumerable boxes of all kinds chuck-full of unmounted and unsorted examples. During the latter part of his life Mr. Lyman's hobby had unfortunately out-grown the time he was able to devote to it. With a knowledge of this condition in mind the University authorities appointed Mr. Albert F. Winn to take charge of the collections and the entomological department of the University and he has proved a very capable curator. Mr. Winn was born in Montreal in 1870 and has always made his home there. He is a member of various entomological societies, including the Entomological Society of London since 1915. At different times he has held offices in the local Branch Society and is a steady attendant at all its meetings. Much credit is due Mr. Winn for keeping active and alive the old time collecting spirit around Montreal. Too often do entomological centers die because one never sees new faces and there seems no one capable of looking into the future in the interest of the local group or of themselves. Mr. Winn has published much in the *Canadian Entomologist,* beginning about 1891, and also a number of his papers have appeared in the NEWS. He has sent over 50 new species for description to specialists, never caring to write them up himself, but allowing others to take that responsibility.

Today the Henry Lyman collection has grown to over 60,000 named Lepidoptera and in other orders the collection has in-

creased from next to nothing to more than 200,000 specimens. Of almost equal historical value to Lyman's types are his specimens of practically everything collected by H. K. Morrison in the early '80s, on his various annual excursions to the western United States. These specimens are generally in series of four of a kind and are part and parcel of the same lots sent to W. H. Edwards and others for naming. Any that were sent out by Morrison before descriptions were in print, were subsequently shown to Edwards and identified by him.

Besides the Lyman types there is also in the Museum the collection and types of the Rev. T. W. Fyles.

The old D'Urban collection of North American material is of little value.

The Pearson collection is a mixed lot of Canadian and United States specimens, though well preserved.

The Bowles collection is fairly large and many fine moths are represented. In the old days this collection was considered quite good.

During this last year the private collection of North American Lepidoptera of Mr. Winn has been acquired by the Museum. It is probably the largest Canadian collection ever made, being rich in named local Lepidoptera in long series and consists of more than 15,000 specimens. Throughout the years Mr. Winn has made many trips in eastern Canada and elsewhere. The Winn collection of exotic Lepidoptera and North American Coleoptera was presented to the Lyman Entomological Room in 1915.

Aside from the North American fauna, which is given preference in every way, there are many Lepidoptera from other regions; notably the butterflies of India of which three good collections have been brought together. One made by the late Lionel de Niceville, collected in Northern India near Sikkim and presented by Dr. C. J. S. Bethume; another from Ceylon, made by Dr. Arthur Willey of the University while he resided in those parts, and the last made by Dr. A. A. Dunlop who stayed many years in Bengal. Recently the Museum has purchased many fine butterflies from that famous European collector, Signor O. Querci. This material is mostly from

Italy, Spain and Portugal and is noted for its absolutely perfect condition. More will be said in later chapters about Mr. Querci, who is at present on a field collecting trip in Cuba.

In conclusion regarding the collections, I might add that many of the rare species collected by the early lepidopterists of the Province of Quebec and the older members of the local Societies have found their way into the safe-keeping of the Peter Redpath Museum. Many insect labels bear the faded signatures of Couper, Barwick, Caulfield, Knetzing, Gibb, Trenholme, Holmes, Fyles, Denney, Chagnon and others. Most of these good fellows have long since passed away, but their names are familiar on the first pages of Canadian entomological history.

The Lyman Entomological Room is used as the monthly meeting place of the local club, the Montreal Branch of the Entomological Society of Ontario, and Mr. Winn has asked me to say that visiting collectors and research workers are particularly invited to attend their meetings. All entomologists are welcome at anytime, however.

A List of Entomological Societies in the United States and Canada.

Doctor L. O. Howard writes: "A few years ago the *Entomologische Zeitschrift* (May 8, 1926) published a list of the German entomological societies, indicating the number of members. There were thirteen in all, with a total membership of 562. I think it would be interesting to all American entomologists if you would publish in *Entomological News* a list of the entomological societies of the United States with an indication of their membership."

We heartily endorse Dr. Howard's suggestion and request the secretaries of all entomological societies and clubs in the United States and Canada to send to the Editor of *Entomological News*, Zoological Laboratory, University of Pennsylvania, Philadelphia, Penna., a statement of the addresses and dates of foundation of their respective associations, the names of the president and secretary of each and the number of active (or resident), of corresponding and of honorary members, that the NEWS may bring together and publish in its pages just such a list as Dr. Howard has in mind.

Notes on Utah Coleoptera.[1]

By the late H. J. Pack.

This paper records the occurrence of a number of species of beetles, some of which have not heretofore been listed from Utah. Some of the wire-worms and long-horned beetles occasionally become rather destructive to field crops or shade or forest trees. The writer wishes to thank Dr. E. C. Van Dyke for his kindness in determining the Cerambycids and Mr. M. C. Lane for naming the Elaterids.

Family Cerambycidae, Long-horned Beetles.

1. Prionus californicus Mots. Collected at Bountiful, August 24, 1929 (Pack); Fort Duchesne, July 10, 1926 (C. J. Sorenson), July 20, 1927 (K. Sorenson), August 1, 1927 (W. Sorenson); Logan; Ogden, July 12, 1906; Provo, 1924 (C. J. Sorenson).

2. Tragosoma depsarium (L.). Logan, August 5, 1903, August 5, 1921 (G. E. King), September 12, 1923 (Knowlton), September 23, 1923 (Pack).

3. Asemum atrum Esch. Ephraim, June 17, 1904; Logan, June 22, 1903 (twenty specimens); Providence, July 15, 1904.

4. Criocephalus productus Lec. Logan, July 14, 1929 (Pack).

5. Romaleum hispicorne (L.). Provo, August 26, 1925 (C. J. Sorenson); on poplar trees at a tourist auto park, Salt Lake City, August 1929 (Pack).

6. Rhagium lineatum Oliv. Logan, July 9, 1904, May 29, 1919 (Henderson).

7. Stenocorus vestitus Hald. Bountiful, June 1929 (Pack); Logan Canyon, July 4, 1909 (Hoff).

8. S. vestitus ater Leng. Logan, June 15, 1929 (Pack).

9. Evodinus monticola (Rand.). Richfield, June 13, 1903.

10. Acmaeops subpilosa Lec. Bountiful, July 20, 1929 (Pack); Pleasant Grove, June 21, 1929 (Pack).

11. Typocerus balteata Horn. Logan.

[1] Contribution from the Department of Entomology, Utah Agricultural Experiment Station. This manuscript was prepared by G. F. Knowlton after the death of Dr. Pack (died January 5, 1930); therefore any mistakes in compiling the list should be credited to the one preparing it for publication. Publication authorized by Director, February 7, 1930

12. ROSALIA FUNEBRIS Mots. Logan, September 3, 1923 (Knowlton), September 13, 1923 (Pack), July 1929 (Pack); Salt Lake City (Maughan).

13. SEMANOTUS LIGNEUS Fab. Logan, April 17, 1905.

14. S. NICOLAS (White). Logan, April 8, 1918.

15. CALLIDIUM ANTENNATUM Newn. Logan, April 10, 1904, April 23, 1905; Payson, April 18, 1904.

16. ANTHOPHILAX MIRIFICUS Bland. Logan, July 9, 1904.

17. XYLOTRECHUS ANNOSUS (Say). Lewiston, May 23, 1923 (Knowlton).

18. NEOCLYTUS CAPREA (Say). A number of adults were reared from apple wood, by school children at Castleton, spring of 1929; Logan, April 26, 1916 (C. J. Sorenson).

19. CROSSIDIUS DISCOIDEUS (Say). Brigham, September 2, 1927 (Knowlton); Logan, September 7, 1906.

20. BATYLE IGNICOLLIS (Say). Fairview, July 20, 1929 (Pack).

21. MONOCHAMUS SCUTELLATUS (Say). Draper, August 1909 (Titus); Logan, August 14, 1921 (G. E. King); Logan Canyon; Provo, August 15, 1924 (C. J. Sorenson).

22. OBEREA TRIPUNCTATA BASALIS Lec. Cache Junction, July 3, 1912 (Hagan); Logan; Manti, June 16, 1903. Several specimens were collected at Franklin, Idaho, May 24, 1923 (Knowlton).

23. TETRAOPES FEMORATUS Lec. Deseret, July 1, 1926 (Knowlton); Fort Duchesne, August 1, 1927 (C. J. Sorenson); Logan, July 20, 1927 (Knowlton); Ogden, June 12, 1927 (Knowlton); Pleasant Grove, July 23, 1929 (Knowlton); Provo, July 25, 1927 (Knowlton); Syracuse, June 29, 1929 (Knowlton). This form is very common in northern Utah.

Family OEDEMERIDAE.

24. CALOPUS ANGUSTUS Lec. Hyrum, April 10, 1916; Logan, April 6, 1905; Ogden, April 7, 1915.

25. COPIDITA BICOLOR (Horn). Logan, August 6, 1907 (Ball).

26. OXÀCIS SERICEA Horn. Numerous on Russian thistle at Grantsville, July 24, 1929 (Knowlton); Plain City, August 5, 1903; Willard, August 7, 1903.

Family ELATERIDAE, Click Beetles.

27. AEOLUS DORSALIS (Say). In clover at Garland, August 2, 1929 (Pack); Logan, July 20, 1929 (Pack); Ogden, May 23, 1929 (Knowlton).

28. LIMONIUS INFUSCATUS Mots. Bountiful, May 11, 1929 (Pack and Janes); Logan, April 6, 1905; Millcreek, April 18, 1910 (Titus).

29. L. BASILLARIS (Say). Logan.

30. PHELETES CALIFORNICUS (Mann.) Lewiston, September 9, 1929 (Pack and Knowlton).

31. ATHOUS PALLIDIPENNIS Mann. Logan, July 30, 1904.

32. LUDIUS MORULUS (Lec.). Logan, July 9, 1904.

33. L. PROPOLA (Lec.). Bountiful, July 12, 1929 (Pack and Janes).

34. L. FALLAX (Say). Fairview, July 10, 1929 (Pack); Divide, Sardine Canyon, June 26, 1929 (Pack).

35. L. LEUCASPIS (Germ.). Salt Lake City, June 6, 1929 (Knowlton).

36. L. INFLATUS (Say). Cache Junction, June 3, 1912 (Hagan); Logan, May 17, 1929 (Knowlton); Mantua, June 1, 1929 (Pack); Divide, Sardine Canyon, June 26, 1929 (Pack).

37. L. SEMIVITTATUS (Say). Logan; Trenton, April 29, 1927 (Knowlton).

38. HEMICREPIDIUS CARBONATUS Lec. Austin, June 25, 1926 (Knowlton); Logan, June 20, 1903 and July 13, 1907.

39. H. HIRTUS Cand. Logan, July 20, 1929 (Pack and Knowlton).

40. CRYPTOHYPNUS SQUALIDUS (Lec.). Logan, September 2, 1903.

41. AGRIOTES FUCOSUS (Lec.). Newton, July 1927 (Pack).

42. A. FERRUGINEIPENNIS Lec. Logan, July 5, 1906 and July 4, 1907.

43. DOLOPIUS LATERALIS Esch. Bountiful, May 25, 1929 (Pack); Cache Junction, April 15, 1906; Logan, August 5, 1903 and September 12, 1904; Mantua, June 1, 1929 (Pack); Provo, June 10, 1906.

44. MELANOTUS FISSILIS (Say). St. George, June 17, 1923 (Hawley).

'45. M. OREGONENSIS (Lec.). Bountiful, June 20, 1929 (Pack); Tooele, June 14, 1929 (Knowlton).

46. CARDIOPHORUS GAGATES Er. Logan, 1923 (Knowlton).

47. C. TENEBROSUS Lec. Logan, July 9, 1904; Mantua, June 1, 1929 (Pack).

48. C. CARBONATUS Bl. Bountiful, May 29, 1929 (Pack and Janes); Logan, April 2, 1905 and April 10, 1910.

Notes on Utah Vespidae (Hymen.).

By C. LYNN HAYWARD.

(Continued from page 205).

Subfamily POLYBIINAE.

6. MISCHOCYTTARUS FLAVITARSIS Sauss. UTAH: Zion National Park, August, 1926, five females (Tanner); Bryce Canyon, two females (Tanner); Moab, June, 1927, three females and two males (Tanner, Cottam, Kartchner, Call); Ute Mountains, Utah-Colorado line, June, 1927, one female (Tanner); Provo, nine females (Tanner, Call, Hayward); Rosevere Creek, Raft River, June, 1927, one female (Tanner); Logan, July, 1926, two males (Hayward); Logan Canyon, Tony's Ranger Station, June, 1926, one female (Brown); Springville, one male (Hayward); Raft River Mountains, El. 10,000 ft., one female (Beck).

CALIFORNIA: Stanford University, July, 1921, two females (Tanner).

ARIZONA: Bisbee, one female (Curtis).

IDAHO: Moscow, one female (Sudweeks); Burley, two females (Beck).

An interesting observation in connection with the specimens of this species in the collection is the close correlation between coloration and locality. While the species as a whole is extremely variable in color and size, the specimens from a given locality have a marked likeness in this respect. Specimens from southern Utah, California, and Arizona are on the whole much lighter in coloration and generally smaller in size than are those from northern Utah and Idaho. The specimens from any limited area are remarkably alike; however, there seem to be some sexual variations, since, in the five specimens from Moab,

the mesothorax is considerably darker in the males than in the females.

Subfamily POLISTINAE.

7. POLISTES FUSCATUS var. AURIFER Sauss. UTAH: Zion National Park, July, 1925, eleven females (Tanner); Pine Valley, June, 1929, one female (Tanner); Lynndyl, September, one female (Tanner); Sheep Creek, Duchesne County, June, 1926, one female (Hayward); Central, June, three females (Tanner); La Sal, June, 1927, seven females (Call); Ute Mountains, Utah-Colorado line, June, 1927, one female (Tanner); Wellsville Canyon, June, 1926, six females (Tanner, Hayward).

CALIFORNIA: Harbor City, San Pedro, one female (Beck).

NEVADA: Lehman Cave, Mt. Wheeler, one female (Tanner).

ARIZONA: Kiabab Forest, July, 1927, one female (Call).

According to Dr. Bequaert, *P. f.* var. *aurifer* and *P. f.* var. *variatus* show such a close intergradation that it is often practically impossible to satisfactorily separate certain specimens of the two varieties. In Utah, these two forms apparently may occupy the same locality and their exact ranges are not well established. Dr. Bequaert suggests, however, that *aurifer* is the more western and *variatus* the more eastern form in the state.

8. POLISTES FUSCATUS var. VARIATUS Cress. UTAH: Provo, seventeen females, seven of which were taken in January (Tanner, Hayward); Logan, August and September, two males (Hayward); Aspen Grove, Timpanogos, three females (Tanner); Riverdale, June, 1926, two females (Tanner, Brown).

IDAHO: Lava Hot Springs, four females (Beck); Driggs, June, 1928, one female (Kartchner); Paris, July to September, seventeen specimens (Hayward).

9. POLISTES FUSCATUS var. FLAVUS Cress. UTAH: St. George, August, 1926, thirteen females (Tanner); Santa Clara, August, 1926, two females (Tanner).

Present records seem to indicate that this species is to be found in Utah only in the Lower Sonoran Zone of the extreme southern part.

10. POLISTES FUSCATUS var. APACHUS Sauss. UTAH: St. George, eight females, two of which were taken in December, 1923 (Tanner); Bluff, San Juan River, June, 1927, thirty-seven females and two males (Tanner, Cottam, Call, Kartchner); Green River, June, 1927, two females (Tanner); Moab, June, 1927, seventeen females (Tanner, Cottam, Call, and Rasmussen).

11. POLISTES CANADENSIS L. var. ARIZONA: Kiabab Forest, Rim of Grand Canyon, July, 1927, twenty-eight females (Tanner, Cottam, Rasmussen, Call).

Dr. Tanner reports that this form was very common on the rim of the Grand Canyon of the Colorado on the day the above collection was made. Dr. Bequaert states that this form is apparently without a variety name, but that it is entirely distinct from the *P. canadensis* L. which occurs in tropical America.

Subfamily VESPINAE.

12. VESPULA ARENARIA Fab. (= *diabolica* Sauss.) UTAH: Wellsville Canyon, June, 1926, two queens (Tanner); Utah Lake, East Side, one worker (Beck); Aspen Grove, Timpanogos, twenty-one workers and two males (Tanner).

IDAHO: Moscow, one queen (Sudweeks); Driggs, June, 1928, one worker (Kartchner).

Although fairly abundant in the northern part of the state, the species seems to be far less common than its variety *fernaldi*.

13. VESPULA ARENARIA Fab. (= *diabolica* Sauss.) var. *fernaldi* Lewis. UTAH: Riverdale, June, 1926, seven queens (Tanner, Brown, Hayward); Bear Ears, Elk Ridge, June, 1927, two queens (Tanner, Call); Lakota, Bear Lake, June, 1926, three queens (Tanner); Summit Danial's Canyon, El. 8,000 ft., July, 1926, one queen and one worker (Tanner, Hayward); Sheep Creek, Duchesne County, June, 1926, two queens (Cottam, Hayward); Logan Canyon, Tony's Ranger Station, June, 1926, five queens (Cottam, Brown, Hayward); La Sal Mountains, one queen (Tanner); Farr West, June, 1926, one queen (Hayward); Payson, one worker (Call); Aspen Grove, Timpanogos, ten workers and one male (Tanner); Provo, twenty-five workers (Hayward).

CALIFORNIA: Stanford University, May, 1923, one worker (Tanner).

WYOMING: Fort Bridger, June, 1926, one queen (Brown); Burnt Fork, June, 1926, one queen (Hayward).

COLORADO: Mesa Verda National Park, two queens (Call, Kartchner).

IDAHO: Paris, six queens and fifteen workers (Hayward).

14. VESPULA ARCTICA Rohw. UTAH: Aspen Grove, Timpanogos, two males (Tanner).

V. arctica is apparently a rare form in Utah.

15. VESPULA MACULATA L. UTAH: Three queens, six workers, one male (Tanner); Aspen Grove, Timpanogos, seven workers and two males (Tanner); Logan Canyon, Tony's Ranger Station, June, 1926, four queens (Cottam); Rosevere Creek, Raft River Mountains, June, 1927, three queens (Tanner); Riverdale, June, 1926, two queens (Tanner, Brown); Lakota, Bear Lake, June, 1926, two queens (Tanner); Wellsville Canyon, June, 1926, one queen (Tanner).

NEVADA: Leham Cave, Mt. Wheeler, June, 1928, one queen (Tanner).

IDAHO: Paris, June and August, one queen and one worker (Hayward).

This species is well distributed throughout the state of Utah, especially in mountainous regions.

16. VESPULA CONSOBRINA Sauss. UTAH: Riverdale, Weber River, June, 1926, one queen (Cottam); Deep Creek Mountains, June, 1928, one queen (Beck); Utah Lake, East Side, one queen (Beck); Logan Canyon, Tony's Ranger Station, June, 1926, one queen (Tanner).

V. consobrina is apparently not a common form in Utah, and the present records indicate the northern parts of the state as its chief range.

17. VESPULA OCCIDENTALIS Cress. UTAH: St. George, eleven queens (two taken in December, 1925) and five workers (Tanner); Zion National Park, August, 1926, sixteen workers (Tanner); La Sal Mountains, June, 1927, four queens (Tanner, Kartchner); Moab, two queens (Call); Bryce Canyon, one worker (Tanner); Provo, one queen and three workers (Tanner, Cottam, Beck); Green River, one queen (Tanner); Douglas, June, 1926, two workers (Tanner, Hayward); Aspen Grove, Timpanogos, five workers (Tanner); Riverdale, June, 1926, four queens (Hayward); Wellsville, June, 1926, two queens (Tanner); Logan Canyon, Tony's Ranger Station, June, 1926, two queens (Tanner, Brown); Summit Danial's Canyon, El. 8,000 ft., June, 1926, one queen (Hayward).

CALIFORNIA: Stanford University, April and May, four queens and three workers (Tanner, Duncan); San Jose, two workers (Duncan); Berkeley, July, 1915, one worker (Smart).

NEVADA: Lehman Cave, Mt. Wheeler, one queen (Tanner).

COLORADO: Mesa Verda National Park, June, 1927, two queens (Call, Kartchner).

IDAHO: Paris, twelve queens (Hayward); Moscow, two workers (Sudweeks); Driggs, June, 1928, one queen and one worker (Kartchner); Lava Hot Springs, one queen (Beck).

The records indicate that *V. occidentalis* is the most evenly distributed of any of the species found in the state. It is probably the most common form to be encountered throughout the entire region.

18. VESPULA ATROPILOSA Sladen. UTAH: Sheep Creek, Duchesne County, June, 1926, one queen (Cottam); Provo, June, 1929, four queens (Hayward); Utah Lake, East Side, four males (Beck); La Sal Mountains, one queen (Rasmussen); Logan, one queen (Hayward).

COLORADO: Mesa Verda National Park, June, 1927, one queen (Call).

IDAHO: Paris, one queen (Hayward).

19. VESPULA VULGARIS L. UTAH: Aspen Grove, Timpanogos, one male (Tanner); Summit of Danial's Canyon, June, 1926, (Hayward); Logan Canyon, Tony's Ranger Station, two queens (Tanner).

CALIFORNIA: Berkeley, June, 1915, one worker (Smart).

IDAHO: Lava Hot Springs, one queen (Beck).

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Tsetse Flies—Past and Present (Diptera: Muscoidea).

By J. BEQUAERT, Harvard University Medical School, Boston, Massachusetts

(Continued from page 203).

The most baffling part of the whole history of tsetses is their viviparous mode of reproduction, which was discovered by Sir David Bruce (1895-1896) in Zululand, probably with *G. pallidipes*. In this connection the reader will be amused by the following fabulous account of viviparity in the tsetse presented in all seriousness to the French Academy by L. de Castelnau in 1858. "The Bushmen," he says, "assert that this fly is viviparous, and Mr. Edwards, the companion of Mr. Chapman, and a highly intelligent man, having one day expressed to them his disbelief as to this, they brought him a pregnant female, and having in his presence opened it along the middle line of the abdomen he states that he saw three little flies ready to take flight emerge from it." In the female tsetse the reproductive organs consist essentially of the same parts as in other insects. A pair of ovaries open by means of a common oviduct in a spacious uterus, capable of great distension. The ovaries are, however, asymmetrical, owing to the alternate ripening of a single egg in the lowest follicle on either side. Fertilisation takes place as the egg passes through the oviduct, in which open the paired ducts of the spermathecae. The egg then progresses into the uterus, where it hatches in a day or so. Here the larva remains during all three stages, being fed by peculiar uterine or milk glands, a system of bilateral branching organs forming a network on either side of the uterus. The common duct from these glands opens just below the ducts of the spermathecae on a small conical papilla, or teat, from which the larva sucks its nourishment. The uterus is also surrounded by a very complex system of tracheae, which bring air to the uterine cavity. In about ten days, under favorable conditions, the larva is full-grown and the female expels it from the vagina, the anal extremity first. After its expulsion the larva takes no food, but it buries itself in the earth, sand or humus,

and its skin hardens into a puparium. With the exception of the genus *Glossina,* this peculiar type of viviparity is known only for the Hippoboscidae, Nycteribiidae and Streblidae, among the Diptera; all these insects being commonly called "pupiparous." Some purists have objected to this term, on the ground that in these flies the female expels a full-grown larva and not a pupa. Yet to simply call them "larviparous" would merely obscure matters, since it would in no way distinguish their case from that of the many other insects that deposit young larvae, freshly hatched from the eggs, and that have made no provision for intra-uterine feeding and respiration. Unless some obliging Greek scholar will provide us with a brand-new term, I see no objection to calling the tsetses pupiparous. Except for the fact that the tegument is not yet hardened, the larva of *Glossina,* when voided by the female, is essentially a puparium.

One more point before leaving the reproductive system. If we examine the third stage larva when nearly full-grown in the female uterus, we notice at the anal extremity a pair of black, sclerotized and almost spheroidal protuberances, which Newstead has called the polypneustic lobes. I believe that the homology of these structures has been misunderstood. The surface of each lobe is more or less divided into three areas by faint grooves and thickly studded all over with papillae, which, as Newstead (1918) has shown, are respiratory openings. A comparison with a series of other Muscoid larvae or puparia (such as, for instance, that published by C. T. Greene in 1921 and 1925) indicates that the polypneustic lobes are not "additional stigmata" (Newstead) or "protective organs" (Roubaud), but modified stigmal plates with an exaggerated branching of the three usual slits or "peritremes." They represent an extreme development of C. T. Greene's "braincoral type" of stigmal plate. Within the deep pit enclosed by the inner lips of the two polypneustic lobes, one finds on either side a small, somewhat raised plate, which in my opinion is the "button", or vestigial scar of the posterior stigma of an earlier larval stage. These two scars have no longer a respiratory function in the third stage, so that the names "posterior stigmata" or "paired ab-

dominal stigmata", applied to them by Roubaud, Stuhlmann, and Newstead are misnomers.

Through what combination of circumstances, or determinism, have the tsetses and the other pupiparous Diptera mentioned above acquired this complicated and slow method of perpetuating the species? Roubaud alone has attempted to answer this question. He regards the *Glossinae*, although free-living, as typical ectoparasites of vertebrates, physiologically as specialised for a blood diet as the Hippoboscidae and Nycteribiidae. He claims that normal, true pupiparity occurs only in flies that are exclusively hematophagous and that live at a constant high temperature. This explanation, though plausible, is not quite satisfying. It fails to take into account the fact that the advantages of a pupiparous mode of reproduction are by no means obvious. Moreover, tropical countries teem with many other free-living biting insects, not to mention the numerous strict ectoparasites, which show no tendency whatsoever toward viviparity. Nevertheless it would seem that some general principle must be involved, since pupiparity has been acquired independently in at least two, if not four, distinct lines of evolution.

The psychic alertness which I have claimed for the tsetses, is displayed once more in the behavior of the gravid females. In search for a vertebrate host the flies roam far and wide; but when parturition is about to take place, the female seeks out the most favorable environment for her offspring. As Roubaud (1909) and G. D. H. Carpenter (1912) have shown in a series of experiments, the pupae of *Glossina* are very fastidious in their requirements of light, humidity and temperature. In addition, the several species differ considerably in this respect. The larvae of *G. palpalis*, for instance, are deposited in cool, shaded, dry places, preferably near the banks of rivers or lakes. An appropriate natural breeding ground of this species often yields hundreds of pupae. Roubaud found that in dry, shaded sand, at a temperature of 25° to 27° C., the pupa develops normally in about 32 or 33 days. The pupae of the savanna species, on the other hand, are not found in the neighborhood of water, though they are also hidden in loose, dry,

shaded material; they are always much scattered and rarely more than ten living pupae are found in one spot. For *G. morsitans* trees hollowed near the base and the shelter beneath fallen trunks are favorite breding places.

The pupae are so well hidden in nature that a weary search is often needed before they can be discovered. Yet they are not entirely able to escape their enemies, the most powerful of which are a number of endoparasitic insects. For some reason as yet obscure, *G. palpalis* seems to be rather free from parasitic attacks: although hundreds of pupae found in nature have been bred of this species, they have yielded only one proctotrupid, which I discovered years ago in Katanga, and one chalcid, obtained by G. D. H. Carpenter in Uganda. No less than twenty parasites attack the pupae of *G. morsitans* (and its race *submorsitans*) and these cover a wide range of groups: mutillids (3 species), braconids (1 species), proctotrupids (1 species), and chalcids (8 species), among the Hymenoptera, and bombyliids (7 species) among the Diptera. The three mutillids have been placed in *Mutilla,* but they are not congeneric with *Mutilla europaea* and, moreover, seem to represent two distinct genera. The bombyliids have recently been revised by Austen (1929), who places them all in the genus *Thyridanthrax.* Of predaceous arthropods, spiders, dragon-flies, and robber flies may occasionally catch an adult tsetse; but certain predaceous fossorial wasps of the genera *Bembix* and *Oxybelus* are perhaps more important enemies of the flies. In his discussion of the enemies and parasites of *Glossina,* Mr. Hegh seems to have overlooked an interesting account of *Bembix* preying upon *G. patpalis,* published by Father Guillemé in the *Revue Congolaise* for 1910 (vol. I, pp. 145-150, Pl. IX).

Most of the topics which I have discussed thus far cover the subject-matter of Mr. Hegh's first volume. The author promises us a second volume, which will deal with the detailed distribution of the species, their habitats, the biology of the adult flies, the feeding habits, the influence of external factors, the methods of control, and the technique used in studying these insects. Some of these points I have touched upon incidentally.

The discussion of the others may safely wait until Mr. Hegh's work is completed. Since, however, he does not intend to deal with the relation of tsetses to disease, I shall close this review with a few comments on this important problem. I shall attempt to keep as strictly as possible within the entomologist's premises.

The annoyance caused to man and beast by the bite of tsetses is unimportant as compared to the rôle these flies play in the transmission of certain diseases. Originally the ravages caused by the tsetse in South Africa were blamed on some "poison" injected by the fly. In 1895, Sir David Bruce announced his epoch-making discovery that nagana, or fly-disease, in domestic animals was caused by a blood parasite carried by *Glossina* from sick to healthy animals. So far as known at present, all diseases caused in man or animals by the bite of tsetses are due to flagellate Protozoa of the genus *Trypanosoma*. Although all species of *Glossina* must be under suspicion as potential vectors, some of them are of outstanding significance in this respect. In general one may say that the rarer or more local species are negligible. The most prevalent type of human trypanosomiasis, or African Sleeping Sickness, as it is often called, is caused by *Trypanosoma gambiense* and transmitted by *G. palpalis*. Consequently it is only contracted within the area occupied by this species of tsetse, which, as I have pointed out above, covers fairly well the West African Subregion. Outside this area, however, a different type of human parasite, which has been called *Trypanosoma rhodesiense*, has given much concern to the medical authorities of Rhodesia and Tanganyika Territory. It is carried by some of the savanna species of *Glossina, viz., G. morsitans, G. brevipalpis,* and *G. swynnertoni*. The several trypanosomes that cause disease in domestic animals are often hard to tell apart, so that no two authorities agree as to how many kinds there are. These animal parasites are transmitted by *G. palpalis, G. morsitans, G. brevipalpis, G. longipalpis, G. pallidipes* and *G. tachinoides*. Wild game plays the rôle of reservoir of the virus, as it is apparently but little or not affected by the flagellates, but infects the flies that eventually will carry the disease to the domestic animals.

Tsetse-flies are not merely mechanical transmitters of the trypanosomes of vertebrates, but the flagellates in the flies go through a definite, though wholly asexual, cycle of development, until they produce infective forms known as "metacyclic trypanosomes." The cycle is not the same for all the species of trypanosomes and one may recognize three different types. In one type, represented by the human parasites, *T. gambiense* and *T. rhodesiense,* the cycle starts in the midgut of the fly, but the infection spreads forward to the proboscis, and eventually to the salivary glands where the infective metacyclic trypanosomes are produced, which are injected in the bite by way of the hypopharynx. In the second, which is that of the animal parasites, *T. congolense* and *T. simiae,* the development in the midgut is followed by invasion of the hypopharynx in the proboscis, but not of the salivary glands. In the third, known for the animal parasites, *T. vivax, T. uniforme* and *T. caprae,* the whole development occurs in the proboscis, there being no intestinal phase and the infective forms entering the hypopharynx directly.

This bare outline suggests some rather intricate biological relations between the trypanosomes and their tsetse hosts, which naturally raise the question as to whether the flies or the vertebrates were the original hosts of these flagellates. The most generally accepted view is, as Wenyon (1926) states, that the trypanosomes of vertebrates were originally purely insect flagellates which gradually became adapted to the blood medium in the gut when the insects became bloodsuckers. Later the flagellates passed into the vertebrates and became adapted to life in the blood stream. Some cogent arguments can be advanced in support of this view. Flagellates similar or closely related to trypanosomes parasitize many other arthropods, even non-bloodsucking species. Moreover, the trypanosomes seem to do no harm to the tsetses. Yet some other peculiarities seem difficult to understand and will necessitate a number of auxiliary hypotheses if one accepts the theory of the *Glossinae* as original hosts.

In the first place, the trypanosomes are not hereditary in the flies nor can they be transmitted by cysts voided in the faeces. The only manner in which newly hatched tsetses can possibly become infected, is by biting an animal the blood of which contains trypanosomes. We must therefore assume that the ancestors of the living tsetses became infected with their flagellates at an early period in their geological history, when they had other feeding habits or at least were not yet strictly blood-sucking. They could then become infected by absorbing cysts voided by other individuals. Secondly, it is a curious fact that the cycle of development of the pathogenic trypanosomes runs its full course in only a small percentage of any species of tsetse: in the other individuals the trypanosomes ingested with the blood simply disappear. The proportion of flies that may become infective is extremely variable and depends upon a multitude of factors, some of which are not yet properly understood. Under ordinary experimental conditions, not more than 2 to 8 per cent of *G. palpalis* ever become capable of transmitting the human trypanosome, *T. gambiense,* a fact which reduces considerably the danger of man becoming infected with African Sleeping Sickness. Again here, we shall have to suppose that this resistance of the fly to the Protozoon is a later development in the phylogeny of the flagellate infection. It may have been caused by the fly not always being able to absorb, with the blood of the infected vertebrate, the right stage of trypanosome, capable of further development in the insect. Or perhaps some reaction of the vertebrate blood upon the flagellate was involved which gradually rendered the trypanosome better adapted to life in the blood stream than in the intestinal tract of the tsetse. Of course, there are other possibilities too.

The transmission of flagellates by tsetse-flies raises many other interesting questions, which, however, I must leave in abeyance. It is high time for me to conclude, for I have been prowling dangerously near the outer fringes of the entomologist's domain. I fear that the protozoologists will become restless and put up "no-trespassing" signs on their own favorite hunting grounds.

Dynastes tityus (Scarabaeid) in Pennsylvania and the Rathvon and Auxer Collections of Coleoptera.

By PHILIP P. CALVERT, University of Pennsylvania, Philadelphia.

(Continued from page 201).

Mr. Jos. S. Wade, in his invaluable *Bibliography of Biographies of Entomologists*,[7] has cited but two biographies of S. S. Rathvon. One is the very brief notice of his death in the NEWS for April, 1891, page 80. The other is by F. W. Goding,[8] which we have not seen.

The library of the Historical Society of Pennsylvania in Philadelphia, contains at least two other sources of information concerning Rathvon and, as neither these nor Goding's biography are accessible to many entomologists, we summarize them here. The longer account is entitled *Simon S. Rathvon, Ph.D., Lancaster's Oldest Living Devotee of Science* by S. M. Sener, Esq. It is an eight page reprint from *Christian Culture*, but is undated and bears no notation as to the volume number or original pagination; it is accompanied by a wood-cut portrait of Rathvon.[9] Sener describes himself as a friend and pupil of Rathvon and wrote his account while Rathvon was living; it is likely that he obtained his information at first hand. The other source is an unsigned article in the *Biographical Annals of Lancaster County, Pennsylvania*. Publishers: J. H. Beers & Co., 1903.

Simon Snyder Rathvon was born at Marietta, Lancaster County, Pennsylvania, April 24, 1812, and died in the city of Lancaster, March 19, 1891. As Simon Snyder was Governor of the State from 1808 to 1817, one may conjecture that the infant received his first two names from that circumstance. His parents were Jacob Rathvon, gunsmith, who settled at Marietta in

[7] Annals Ent. Soc. Amer., xxi, pp. 489-520, Sept., 1928.

[8] Penna. State Hortic. Assoc. Official Doc. no. 4, 3 pp., no date.

[9] Prof. Carroll has kindly ascertained for me that *Christian Culture* was "A Local Interdenominational Journal, published monthly at No. 9 North Queen St., Lancaster." It was continued for three volumes through the years 1890, '91 and '92. S. M. Sener's paper, quoted above, occurs in Vol. I, No. 10, pp. 7-8. Through Prof. Carroll also, I owe to Mr. Anstaett, librarian of F. & M. College, the information that J. H. Beers & Co. was a Chicago firm.

1810 and died in 1839, and Catharine Myers, of York County, who died at Marietta in 1825. Jacob was the son of John George Rathvon (Dec. 7, 1747-Aug. 7, 1799), a lieutenant in the Pennsylvania militia during the Revolutionary War, and Christine Kraemer (d. July 21, 1799), of Warwick township. John George, in turn, was a son of Christian Rathvon, who, with a brother George, settled in Conestoga township, Lancaster County, in 1740, having emigrated from either southern Germany or Switzerland.

Simon S. Rathvon's formal education was obtained between his seventh and tenth years, at three common schools, where he learned to "read, write and cipher as far as compound division". From 1827 to 1832, he was apprenticed to John Bell, tailor, in his native town. "In 1832 he commenced tailoring on his own accord and subsequently went to Philadelphia but returned to Marietta and carried on his trade there until he removed with his family to this city [*i. e.* Lancaster] and to-day may be seen actively engaged at the bench" (Sener). In 1832 he became a member of a literary society which numbered among its members Prof. S. S. Haldeman, Judge J. J. Libhart and others; it was soon merged into a Lyceum of Natural History with Rathvon as secretary. Sener reproduces some interesting early entomological experiences of Rathvon in the latter's own words and credits Haldeman with giving him his chief stimulus to the study of insects. Referring to Rathvon's acquisition of Haldeman's collection, Sener says "all that remains of the Hentz-Haldeman collection is now in the collection of Dr. Rathvon."

Rathvon's attention was largely directed to the economic side of entomology [10] and he became Professor of Entomology to the State Horticultural Society in 1861, Professor of Entomology to the Philadelphia [correct name, Pennsylvania] Horticultural Society in 1864 and Entomologist to the Lancaster County Agricultural Society in 1869. He was one of the founders of the Linnean Society of Lancaster in 1862, and became its cura-

[10] A list of 29 of his publications in this field, from 1854 to 1880, is given in Samuel Henshaw's *Bibliography of the more important Contributions to American Economic Entomology*, Part V. Washington, Govt. Printing Office, 1896.

tor, treasurer and entomologist. He was in editorial charge of the *Lancaster Farmer* from 1869 to 1884. Franklin and Marshall College gave him the degree of Ph.D. in June, 1878.

On May 27, 1834, he married Catherine Freyberger at Marietta, and had seven sons and four daughters.

Two other entomological collections are in the Franklin and Marshall College Museum, those of Dr. M. W. Raub, comprising North American and exotic Lepidoptera and Coleoptera, and of Samuel Auxer, consisting of Coleoptera, Lepidoptera, Hemiptera, Hymenoptera and Neuroptera. Unfortunately, with the exception of some beetles in the Raub collection marked as from Lancaster, most of these specimens lack locality labels. While visiting the Rathvon Collection, however, I saw a male specimen of *tityus* in a box reposing in another room. It had printed labels "Dynastes Tityus Linn" and "Pa.". This box, Prof. Carroll informs me, was part of the Auxer Collection.

A brief obituary notice of Samuel Auxer (1835-1909) was published in the NEWS for February, 1909, page 96, but some additional information concerning him and his collection has come to me from Mr. Fisher and from Prof. R. C. Schiedt, Emeritus Professor of Biology at Franklin and Marshall, through Prof. Carroll. Mr. Fisher writes:

I was very well acquainted with Samuel Auxer and went collecting with him a number of times. He usually collected between Lancaster and the Susquehanna River near Pequa. He also did some collecting in the Mount Hope region along the South Mountains, Lancaster County. Mr. Auxer usually did not label his specimens, but gave a number to the material collected each time in a certain locality, the numbers corresponding to a number in his note book, where he kept the date, locality and any other important records. After his death Mrs. Auxer asked me to come to Lancaster and look over his library, and we made a thorough search for this note book but it could not be found. It was probably thrown among some trash and carted away, although Mrs. Auxer did not remember seeing it. Mr. Auxer corresponded and exchanged specimens with collectors in all parts of the United States, and since most of his material was unlabeled, it is impossible to determine where the specimens were collected.

Samuel Auxer kept a second-hand book store in Lancaster,

but he had retired from the business before I became acquainted with him. A large number of the books from the store were at his home and were sold after his death. I do not remember Mr. Auxer mentioning anything about Rathvon during any of my visits to his place.

Mr. Ernst Jeheber was also a very good friend of Mr. Auxer, and he was also at Auxer's home helping to straighten out the library and collection. Mrs. Auxer wanted to sell the collection and Jeheber told me he might buy it. Mr. Jeheber was a German tailor and worked at his trade in Lancaster. He was interested in Lepidoptera and had a very nice local collection, mostly in plaster mounts and in almost perfect condition. I went collecting with him a great many times, but in December, 1914, received a letter from him in which he said he was going to [West Point,] New York, and that he would write to me later, but I never received any note from him. In this letter he mentioned that he was selling his entire collection to Mr. [Charles Fred] Grimm, also a German collector, [of 649 St. Joseph St., Lancaster], but this probably referred only to his Lepidoptera collection. It seems certain that Mr. Jeheber bought the collection from Mrs. Auxer for Dr. Schiedt, as Jeheber was not interested in Coleoptera, and he did not have the room to keep the collection or the money to spend on a personal collection, as he had a very large family. I am enclosing Mr. Jeheber's last letter to me as I thought it might be of some interest to you. [Insertions enclosed in square brackets in the preceding account have been taken from this letter. P. P. C.]

Previous to my correspondence with Mr. Fisher, Prof. Carroll had written me that Jeheber bought the Auxer Collection and that Dr. Schiedt bought it from Jeheber.

It is remarkable that, in spite of the extensive and intensive collecting of Coleoptera which has been done in Pennsylvania within the last fifty years, so few specimens of *tityus* have been found, and the rediscovery of this species in the State is a quest worthy to be undertaken by our naturalists. They may find some hints, perhaps, in the late Mr. Manee's account [11] of collecting *tityus* in North Carolina. It is to be hoped that Rathvon's collection will be carefully preserved and that some local and enthusiastic entomologist, through antiquarian research, will be able to learn more of the provenance of its specimens than it is now possible to ascertain.

[11] Ent. News, xxvi, p. 266, 1915.

On Tropisternus sublaevis Lec. and T. quadristriatus Horn (Coleoptera: Hydrophilidae).

By H. C. FALL, Tyngsboro, Massachusetts.

Of the above-named species, *T.* (*Hydrophilus*) *sublaevis* was described by Le Conte in 1855 from Nebraska and Georgia. There are at present in the Le Conte Collection two Nebraska specimens (♂ ♀), but none from Georgia, and this was the case thirty years ago when I first examined the Le Conte types. *T. quadristriatus* was described by Horn in 1871 from specimens collected "near the seacoast of New Jersey." A few years later (1874) this species was suppressed by Horn himself as identical with *sublaevis* Lec.

Just what became of the Georgia specimen of *sublaevis* mentioned by Le Conte is unknown to me. I had suspected that between 1871 and 1874, in accordance with a custom prevailing with Le Conte and Horn of sharing their material, the Georgia specimen was turned over to Horn and led him to pronounce his species the same as that of Le Conte. On inquiring of Mr. Liebeck he informs me that there is only a single example each of *quadristriatus* and *sublaevis* in the Horn collection, the former bearing a "N. J." label, the latter without indication of locality but with a small square on the pin bearing the number "10" as though sent by some correspondent for determination. I think it unlikely that this is the Georgia specimen of Le Conte, but whether so or not, it is identical with the one on the *quadristriatus* label.

In 1902, August 10-12, Mr. Frederick Blanchard and the writer collected at Marion, Massachusetts, on the shore of Buzzard's Bay. From brackish pools near the shore line we took specimens of a *Tropisternus,* which from the similarity of localities we judged correctly to be the *quadristriatus* of Horn. A day or two later I compared these Marion specimens with the Nebraska types of *sublaevis* and satisfied myself that they were specifically distinct, a result which might reasonably be anticipated when the remoteness and difference of habitat conditions are considered.

Some eight or nine years ago I received from M. d'Orchymont a letter of inquiry concerning certain of our species of *Tropisternus.* In reply I sent him among others a specimen of

the Marion *quadristriatus* and expressed the opinion that Horn had been in error in uniting the species with *sublaevis*. This opinion is reflected in d'Orchymont's paper of 1922,[1] where he gives both *quadristriatus* and *sublaevis* a place in his table, though admitting his uncertainty as to the precise status or position of the latter. In reality *sublaevis* is out of place in d'Orchymont's table where it stands with a question mark next to *quadristriatus,* its true position being with those species having the pubescent area of the hind femur very small. As a matter of fact *sublaevis* by this table runs directly to *xanthopus* Sharp, with which I have no doubt whatever of its identity, *sublaevis,* of course, being the older name. In this connection d'Orchymont's remark that he received from the British Museum specimens identified by Sharp as *sublaevis,* and that they proved to be *xanthopus,* is interesting and significant.

So far as *sublaevis* and *quadristriatus* are concerned there are two characters by which they may be definitely separated, one, however, requiring the presence of males.

Pubescent area of hind femur very small, confined to the extreme base; sternal keel nearly or quite smooth in both sexes ..... *sublaevis*

Pubescent area of hind femur comparatively large, occupying fully the basal third; sternal keel with numerous moderately coarse punctures in the male, nearly smooth in the female, except at the basal declivity..... *quadristriatus*

Sublaevis is represented in my collection by specimens from El Paso, Texas and Albuquerque, New Mexico, and I have seen specimens from Denver, Colorado, sent me for identification by Mr. Liebeck. M. d'Orchymont has seen two examples from California and four of somewhat larger size from Texas, all being identified as *xanthopus.*

Of *quadristriatus* my only representatives are those taken as above noted at Marion, Massachusetts. This species is probably restricted to the near vicinity of the Atlantic coast line, and may or may not be confined to the more or less brackish waters of that region. There can be no doubt I think that Le Conte's original Georgia *sublaevis* belonged to the present species.

[1] Le Genre Tropisternus II. Annals de la Societé Entomologique de Belgique, LXII, 1922.

And now a word as to *T. glaber* Herbst. As is well explained by d'Orchymont in the paper above referred to, there are now no specimens in European collections which can be fixed upon as the original types of Herbst, or that can safely be assumed to be the equivalent thereof. The *glaber* of Le Conte may or may not be the same as that of Herbst, but in any case there would seem now to be no better course than to consider it as representative of the species. The question then is just what is the *glaber* of Le Conte? The Le Conte series, as I have myself observed, looks complex; it probably comprises two and possible more species. D'Orchymont has already described one new species (*blatchleyi*) at the expense of *glaber*.

Le Conte did not label his types as such; it has been customary, however, in dealing with his collection to consider the specimen on the name label as the type, provided it agreed with his description, and in the case of *glaber* I have noted that this agreement exists.

As the result of a critical survey of the specimens in my collection hitherto assigned to *glaber*, I have sorted them into four series, each possessing a combination of characters differing in some respects from each of the others. To one of these groups —my no. "3"—Le Conte's type is assignable; I am, however, not yet prepared to assert anything as to the constancy or significance of the differences observed in my limited material. Further study with additional specimens may permit the drawing of some definite conclusions.

The National Museum of Costa Rica.

On March 8, 1930, Professor J. Fidel Tristán was appointed Director of the Museo Nacional de Costa Rica, at San José, after he had served for thirty years as professor in the colleges of San José as well as Director of the Colegio de Señoritas and of the Liceo de Costa Rica. Professor Anastasio Alfaro is Chief of the Zoological Department. Owing to the economic situation of the country, the Museo has suffered for a long time. It is now hoped to revivify it.

XI International Congress of Zoology.

The X. International Congress of Zoology (Budapest 1927), accepting the invitation of the Italian Government, unanimously decided to hold its XI. Session in Padua 4–11 September, 1930, under the chairmanship of Prof. Paolo Enriques, Director of the Institute of Zoology, Comparative Anatomy and Physiology in the Royal University.

We have the honour to invite all Zoologists and the friends of Zoology to be present at this International Congress.

Prof. PAOLO ENRIQUES, President of the Congress; Prof. GIANNINO FERRARI, Rector of the University; Count FRANCESCO GIUSTI, Mayor of Padua.

Applications for membership should be sent by registered post, if possible, to; Prof. PAOLO ENRIQUES Congresso Zoologia, Via Loredan 6, Padova (Italy) together with fee, 100 lire (cheques should be made payable to "Banca Commerciale Italiana Padova, Presidente Congresso Zoologia"). Fee may also be sent directly to the Bank (to the above mentioned account). The membership-card will be sent as a receipt. There will be a section for Entomology.

The Rocky Mountain Conference of Entomologists.

The seventh annual meeting of the Rocky Mountain Conference of Entomologists will be held in Pingree Park, Colorado, August 18 to 23 inclusive. As in the past the meeting will be held at the Colorado Agricultural College Forestry Lodge and will be planned that all members of the family may attend and enjoy themselves. The sessions for papers will be informal with ample time for discussion. We will be pleased to have subjects of papers at an early date. To those that have not attended any of the previous meetings it might be said that bedding and meals are furnished at a prorated cost that has always been reasonable. Since the meeting place is more than 50 miles from Fort Collins, the nearest source of supplies, it is important that those arranging for the care of the crowd know in advance just how many expect to attend. Transportation to the park will be available for those not having their own cars. A later notice giving more of the final details of arrangements will be sent to those indicating that they may attend. A card to the Secretary will bring you this later notice.

GEORGE M. LIST, Secretary—Fort Collins, Colorado.

Entomological Literature

COMPILED BY LAURA S. MACKEY UNDER THE SUPERVISION OF E. T. CRESSON, JR.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

The numbers **within brackets** [ ] refer to the journals, as numbered in the list of Periodicals and Serials published in the January and June numbers (or which may be secured from the publisher of Entomological News for 10c), in which the paper appeared. The number of, or annual **volume,** and in some cases the part, heft, &c. the latter **within** ( ) follows; then the pagination follows the **colon** :

All continued papers, with few exceptions, are recorded only at their first installments.

*Papers containing new forms or names have an * preceding the author's name.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

☞ *Note the change in the method of citing the bibliographical references, as explained above.*

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GENERAL.—Anon.—The rules of zoological nomenclature. [31] 125: 733-734. **Brèthes, J.**—Bio-bibliografia. By E. D. Dallas. [104] 2: 103-107, ill. **Breyer, A.**—Un viaje de estudio al norte de Misiones. (S). [104] 2: 271-276. **Carpenter, F. M.**—A review of our present knowledge of the geological history of the insects. [5] 37: 15-34, ill. **Clark, A. F.**—The food of some insects. [New Zealand Jour. Sci. Tech.] 11: 366-370. **da Costa Lima, A.**—Sobre insectos que vivem maracujás (Passiflora spp.). [Mem. Inst. Oswaldo Cruz] 23: 159-162, ill. **de la Torre-Bueno, J. R.**—The type fetish. [5] 37: 80-82. **Eckstein, F.**—Ein beitrag zur experimentellen parasitologie der insekten. [Zeit. Parasitk.] 2: 571-582, ill. **Frers, A. G.**—(Bio biliografia). By E. D. Dallas. [104] 2: 289-292. **Friedericks, K.**—Ueber entomologie als studium. [17] 47: 19-20. **Hayward, K. J.**—Sobre migración de insectos, con referencia especial a la Argentina. [104] 2: 209-216, ill. **Horn, W.**—Sobre la fundación de un Instituto internacional de Servicio Entomológico en Suiza. [104] 2: 233-234. **McAtee, W. L.**—The scientific attitude in nomenclature. [10] 32: 65-66. **Mosely, M. E.**—Ronald's collection and the "Fly-Fisher's Entomology". [8] 66: 116-120. **Orfila, R. N.**—La primera exposición Entomológica Argentina efectuada en Buenos Aires del 19 al 25 de Septiembre de 1928. [104] 2: 121-156, 161-178, ill. **Orfila, R. N.**—Suplemento á la Entomobibliografia Argentina 1927 y 1928 [104] 2: 161-178. **Saez, F. A.**—Puede la citologia influir en la orientación de los problemas taxonómicos? [104] 2: 251-

262, ill. **Schilder, F. A.**—Vademecum der Internationalen nomenklaturregeln. [2] 26: 18-25. **Schilder, F. A.**—Eine randbemerkung über bestimmungstabellen. [11] 1930: 79-80. **Strand, E.**—Zoological and palaeontological nomenclatorical notes. [Act. Univ. Latvia] 20: 1-29. **Strand, E.**—Ueber die bedeutung der typen für die naturhistorische nomenklatur. [Acta Univ. Latvia] (Math. u. Dab. Zinat.) 1: 81-100. **Strand, E.**—Enumération des travaux zoologiques publiés jusqu'en 1929. [Latvia. Univ.] 1919-29: 358-381, 1-24. **Van Duzee, E. P.**—Concerning scientific names. [55] 6: 166. **Woodworth, C. W.**—The synchronization of life histories. [55] 6: 189-191. **Wucherpfennig, F.**—Armut oder Reichtum der falterfauna Brasiliens. [18] 24: 49-55, ill.

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tinos. Buenos Aires, 1928. 12pp. **Kumberg, C.**—Abarten von Morpho aega. [14] 44: 61, ill. ***McDunnough, J.**—The lepidoptera of the north shore of the Gulf of St. Lawrence. [4] 62: 107-117, ill. **Moore, S.**—Lepidoptera of the Beaver Islands. [Occ. Pap. Mus. Zool., Univ. Mich.] 214: 28pp. **Stichel, H.**—Lepidopterorum Catalogus. Pars 38. Riodinidae I: Nemeobiinae I. 112pp. **Stichel, H.**—Ein schlusswort in sachen, Erycinidenarbeiten. [11] 1930: 57-62. **Zikan, J. F.**—Beitrag zur biologie von Orecta lycidas und Chlaenogramma muscosa. [104] 2: 95-98, ill. ***Zikan, J. F.**—Copiopteryx virgo n. sp. (S). [104] 2: 335-336, ill.

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EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and only when necessary those at the top (being longest in) are discontinued.

Wanted—Everes comyntas and amyntula from all parts of N. Am. by purchase or exchange for local lepid. Dr. Edwin P. Meiners, 6600 Delmar Blvd., St. Louis, Mo.

Wanted for Exchange or Determination, specimens of the genus **Eucerceris** of the Hymenoptera, tribe of Cercerini. H. A. Scullen, Department of Entomology, Oregon State Agricultural College, Corvallis, Oregon.

Mordellidae of the world wanted in exchange for North American species. Address Dr. F. J. Psota, 2434 South Crawford Avenue, Chicago, Illinois.

Oxybelinae (Sphecidae, Hymenoptera)—Wanted from all parts of North and South America and West Indies. Will determine, exchange or purchase. V. S. L. Pate, Entomology Dept., Cornell University, Ithaca, N. Y.

Wanted—Names and addresses of collectors of insects, particularly Lepidoptera. Those from foreign countries especially invited. Will pay cash or exchange. Peter M. Casamento, P. O. Box 276, West New York, New Jersey.

Exchange—All groups of Lepidoptera in exchange for Noctuidae of the World. Foreign correspondence desired. A. Glenn Richards, Jr., Roberts Hall, Cornell Univ., Ithaca, N. Y., U. S. A.

Exchange—Lepidoptera of the Northwest for beautiful and showy exotics. C. W. Herr, Priest River, Idaho.

WANTED for cash or in exchange, hibernating pupae, especially Papilios, Saturniidae, Eacles imperialis, Autom. io and others from all parts of the States, Canada and Mexico. Send lists with best prices to Max Rothke, 1846 East Elm St., Scranton, Pa.

Mordellidae from all parts of the world wanted for special study. Will determine, exchange or purchase. Emil Liljeblad, 1018 Roscoe St., Chicago, Illinois.

Exchange—Will exchange California Butterflies for any of your locality. What have you to offer? Correspondence solicited. John Imschweiler, 748 N. Eucalyptus Ave., Inglewood, California.

Exchange—Oregon Lepidoptera for those of your locality. Kenneth M. Fender, 930 South Davis St., McMinnville, Oregon.

Exchange—Will exchange Montana Lepidoptera and Coleoptera for material of your locality. Correspondence solicited from all parts of the world. W. F. Lawrence, 2209 6th Ave. No., Great Falls, Montana.

Exchange—South American, also Java, Borneo, Celebes and Madagascar Butterflies in lots by 12.50 or 100 monthly arrivals. Wish for revisional study all North American PARNASSIUS and ARCTIIDAE also APANTESIS. Communicate with Mrs. Emma Kessler, 499 Manhattan Ave., New York City, N. Y.

Wanted.—Elateridae and their larvae (wireworms) from all parts of North America; would prefer the larvae alive, if possible, for biological studies. Will exchange Pennsylvania Elateridae and Scarabaeidae.—C. A. Thomas, Penna. State College Lab., Kennett Square, Pa.

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